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Approved For Release 2002/08/14 : CIA-RDP81B00878R000800100040-4

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89-1806

29 April 1955

MEMORANDUM TO: CHIEF, D/GP

FROM : 25X1A

SUBJECT : (1) Development of Aerial Photographic Processing Equipment
(2) Aerial Film Viewer (Reconoscope)
(3) Refinements in Long Focal Length Cameras
(4) Study of Errors Induced by Refraction in Oblique Photography

The primary purpose of the visit to Wright-Patterson Air Force Base near Dayton, Ohio, was to obtain information concerning photo processing equipment reported as being presently under development.

25X1A A delay of twenty-four hours was caused by lack of proper security clearance information. The equipment in question is related to the highly sensitive project and is being conducted on a strictly "need to know" basis. The difficulty regarding my clearance arose from two major errors. The first was failure to address the clearance information to the proper office, it having been sent to ATIC instead of the Photo Reconnaissance Branch. The second was failure to establish the proper "need to know" basis for the visit.

I was very much impressed by the high security standards at W. P. and found everyone very cooperative in obtaining the required clearance information.

I. The photo processing equipment under discussion was originally suggested by Colonel Philbrick, USAF, of the Aeronautical Chart and Information Center, located in St. Louis, Missouri, and based on the idea that presently available equipment is inadequate for processing aerial film taken under widely varying conditions. The research and development of the equipment has been carried on at Wright-Patterson AFB as project 119-L and under the direction of Major Yochim, USAF.

The concept of an automatic aerial processing machine was originally not considered practical for use with normal aerial film. Discussions of the problem with various film producing companies led to the development by Eastman of a film, SO-1121, which possessed characteristics making feasible the development of automatic processing equipment.

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The equipment presently being designed at W. P. will be constructed by [] A mockup should be ready in approximately six weeks with the first machine scheduled for delivery in September, 1955.

The above delivery dates and following specifications are based on the requirements as outlined by ACIC. The shifting of processing responsibilities, for which the machine is designed, to SAC has raised the question at W. P. as to whether there will still be a requirement for the equipment and as to possible change in specifications. Wright-Patterson intends to continue the project even though SAC does not intend to utilize the machines. Should this be the case the project will be removed from its present "crash" basis.

Operational Details and Sketch

The film enters the machine from the film spool and undergoes a one minute developing process which is then stopped with a water spray.

Moving at a rate of five feet per minute, the film then passes over an infra-red scanning device (see Note 1). This determines and records the required development data required for individual frames or exposures.

After passing the "scanner" the film enters an area providing additional development as required. This ranges from one to twelve minutes. Individual treatment of frames is obtained through use of a series of separators (see Note 2) spaced one frame apart and a series of nozzles (see Note 3) which allows for the straying of developer or water as may be required.

The film, having received its proper development time, then completes the processing by proceeding through a fixing and a washing section and finally passes under the machine through a warmed "drying chamber" to the take-up spool.

To prevent loss of film through power failure or mechanical failure it is planned to provide a stand-by electric generator, capabilities for use of hand-cranks, and stand-by pumps.

Note 1 - Scanning Device

This utilizes infra-red light to scan or visually study the film for determination of the proper development period. Such light does not fog or damage the film prior to development. The source is a 350-line Vidicon tube. This U. S. brand tube is being used in preference to improved foreign equipment, such as an English produced 700-line tube, due to ease of procurement and maintenance.

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The scanner records the required information on a punch tape which will then control the development of an individual print.

In addition, an operator will visually scan the film and check the readings provided by the automatic scanner. In cases where there are very minor variations between frames, one or two minutes, the operator may assign an average time which will cause the simultaneous use of developer on succeeding frames and allow the reclaiming and reuse of such developer.

The scanner will be set on the basis of minimum density readings. This is to allow for the development of areas containing the maximum potential information. Should maximum density be used it would mean that items such as desert areas, clouds and snow would often be controlling factors.

Note 2 - Separators

The separators are spaced approximately 10 inches apart in order to include a single 9-inch frame. Their purpose is to allow the simultaneous spraying of developer or water to consecutive frames as may be required. If any difficulty arises as to the use of such separators they may be eliminated which would mean that three frames would receive simultaneous sprays of water or developer. This would be of little consequence except in cases where there were rapid and extreme changes in the required development period.

Note 3 - Spray Nozzles

The application of the developer and the stopping of the processing with water will be carried on by a spray method. There will be a nozzle located between each pair of separators, or, in other words, one for each frame.

The flow of developer or water will be governed by the punch tape from the scanning device or by the machine operator. Where there is little variation in time of development, one or two minutes, for a series of frames, the operator will assign an average development time. This will allow the simultaneous use of developer from succeeding nozzles and will make possible the saving and reuse of such developer.

Remarks: The machine appears to be of workable design and possessing the capability of operation in case of emergency which reduces possibility of film loss to a minimum.

II Aerial Film Viewer (Reconoscope)

The Reconoscope is a device for viewing aerial film as a positive transparency. The film is fed into the instrument and by means of television circuits the image is reversed and relayed to a television tube where it is viewed as a normal photograph. In addition, the instrument has the capability of enlarging any portion of the photo for closer inspection of specific areas.

This instrument appears to have a definite potential use where it is desired to immediately study a negative without waiting for the preparation of prints.

III Refinements in Long Focal Length Cameras

Wright-Patterson is presently installing additional recording equipment on the long focal length cameras (100-inch & 240-inch). Individual prints from such cameras will now contain information as to mission number, time of exposure and depression angle. The depression angle reading is obtained by a gyro connection and is recorded to the nearest degree for the 100-inch camera and to 15 minutes for the 240-inch camera. Major Yochim of W. P. feels that a safe minimum reading may be taken to 30 minutes.

IV Study of Errors Induced by Refraction in Oblique Photography

A considerable error in vertical angular measurements is introduced by refraction in oblique photography with small depression angles. Such errors may run as high as 10 or 12%. Wright-Patterson has a contract with at the present time to conduct research into the variations and magnitudes of such errors.

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